



## GROUND SYSTEMS

### Development and Operations

EXPLORATION BEGINS HERE



## PROGRAM HIGHLIGHTS • OCTOBER 2012

At NASA's Kennedy Space Center in Florida, the Ground Systems Development and Operations (GSDO) Program office is leading the center's transformation from a historically government-only launch complex to a spaceport bustling with activity involving government and commercial vehicles alike. GSDO is tasked with developing and using the complex equipment required to safely handle a variety of rockets and spacecraft during assembly, transport and launch. For more information about GSDO accomplishments happening around the center, visit: <http://go.nasa.gov/groundsystems>.



### SLS Umbilical Arm Ready for Testing

Engineers in Ground Systems Development and Operations Program (GSDO) at Kennedy Space Center have completed a system installation and integration of a test umbilical arm. Components of this arm eventually will be mounted on the new mobile launcher tower to support vital functions on NASA's Space Launch System, or SLS, an advanced heavy-lift rocket that will provide the capability for human exploration beyond low Earth orbit.

A key element of NASA's plan for future exploration, the SLS rocket will boost the Orion spacecraft designed to carry crews of four to deep space missions to asteroids and eventually Mars.

The test umbilical arm will support cryogenic, or super-cold, propellant loading for the new rocket's propulsion systems. It recently was mounted to the mobile launcher tower simulator at Kennedy's Launch Equipment Test Facility, or LETF, for further checkouts and simulations.

The results and lessons learned from the testing will be used to develop the next round of umbilical hardware.

When testing is complete, some of the hardware will

be re-used as part of the Orion service module umbilical on the mobile launcher.

The Orion spacecraft consists of four main parts: a conical crew module, a cylindrical service module holding the spacecraft's propulsion system and expendable supplies, the launch abort system and spacecraft adapter. The service module umbilical arm supports the primary power and environmental control systems of the spacecraft.

With the umbilical arm attached to a simulated portion of the launch umbilical tower at the LETF, a complex series of simulations will follow.

Steve Larsen, lead design engineer for liquid oxygen systems in NASA's Engineering and Technology Directorate at KSC, said the primary objective of the tests will be to validate engineering analysis models involving the dynamics of the umbilical arm's retraction, stress and thermal conditions at the ground-to-flight interface. Some secondary objectives include evaluating a new fault-tolerant quick disconnect, measuring the performance of a new type of insulation for environmental control system pipes, and assessing the viability of the technology for use on the SLS.

For the complete story, visit [http://www.nasa.gov/centers/kennedy/home/umbilical\\_arm\\_testing.html](http://www.nasa.gov/centers/kennedy/home/umbilical_arm_testing.html)

View a time-lapse video of the Vehicle Assembly Building platform removal. Check out the video at <http://go.nasa.gov/Wbn8LN>.

Read the story on page 2 of this edition of GSDO Program Highlights.

## Crawler-Transporter Modifications

Inside the VAB, the GSDO team successfully started up the two new Cummins diesel engine generator sets on crawler-transporter-2 (CT-2) on Sept. 17 and 18 to verify fluid levels, maintain idle and running speeds, monitor oil pressure and coolant temperature, check for leaks in the exhaust, coolant and fuel lines and obtain vibration base-line data.

The tests were performed in order to prepare for the crawler-transporter's rollout from the VAB to Launch Pad 39A in early November.

The two crawler-transporters have carried space vehicles such as the Apollo-Saturn V and the space shuttles to the launch pads since the mid-1960s.

NASA is now working with U.S. industry partners to develop commercial spaceflight capabilities to low Earth orbit as the agency also is developing the Orion Multi-Purpose Crew Vehicle and the Space Launch System, a crew capsule and heavy-lift rocket to provide an entirely new capability for human exploration.

For the complete story, visit [http://www.nasa.gov/centers/kennedy/pdf/167402main\\_crawler\\_transporters07.pdf](http://www.nasa.gov/centers/kennedy/pdf/167402main_crawler_transporters07.pdf)



## Media Event in Vehicle Assembly Building

On Oct. 5, members of the media viewed the removal of some of the shuttle-era work platforms from High Bay 3 inside the Vehicle Assembly Building (VAB). Jim Bolton, head of operations in the Vehicle Assembly Building, provided a briefing on GSDO's involvement in the VAB modifications to support the Space Launch System and a variety of other vehicles.

As part of GSDO work at Kennedy, space shuttle-era work platforms have now been removed from high bay 3

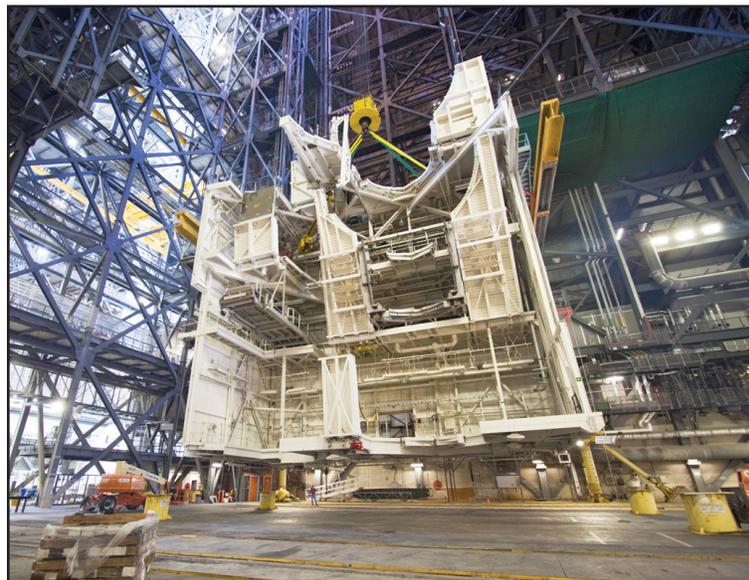


of the VAB. The effort is part of a center-wide modernization and refurbishment initiative to accommodate NASA's Space Launch System and a variety of other spacecraft instead of the whole building supporting one design.

GSDO is developing the necessary ground systems, infrastructure and operational approaches required to safely process, assemble, transport and launch the next generation of rockets and spacecraft in support of NASA's exploration objectives.

Future work also will replace the antiquated communications, power and vehicle access resources with modern efficient systems. Some of the utilities and systems slated for replacement have been used since the VAB opened in 1965.

For the complete story, visit <http://science.ksc.nasa.gov/facilities/vab.html>



## Awards Corner

The GSDO Peer Awards for fiscal year 2012 were held on Oct. 5. The awards were presented by the Program Manager Pepper Phillips and the Deputy Program Manager Jennifer Kunz.



Awards were presented in four different categories. Diamond Peer Awards were presented to Peter Lyon and Cliff Lanham. Mission Impossible Peer Awards were presented to Christie Best and David Bradford. Steady Helm Peer Awards were presented to Jose Lopez and Jim Gray. Secret Hero Peer Awards were presented to Trudy Hill and Regina Britton.